

WHAT IS CLAIMED IS:

1. A radiation-curable, aqueous polyurethane emulsion prepared by a process comprising:

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A) reacting

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1) at least about 5% by weight of an hydroxy group containing, unsaturated polyester acrylate having an OH number of from about 40 to about 200,

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2) at least about 5% by weight of a polycarbonate diol having an OH number of from about 28 to about 225,

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3) from 0 to about 30% by weight of a polyether diol having an OH number of from about 28 to about 225, with the proviso that if component 3) is present, the weight ratio of component 2) to component 3) is from about 0.5:1 to about 25:1,

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4) from 0 to about 10% by weight of a monohydroxy hydrophilic polyether,

5) from about 0.1 to about 20% by weight of one or more mono- or difunctional isocyanate-reactive compounds that contain moieties selected from cationic groups, anionic groups, potential cationic groups and potential anionic groups, with

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- 6) from about 10 to about 50% by weight of one or more diisocyanates and/or polyisocyanates,
- B) optionally converting any potential cationic or anionic groups into cationic or anionic groups by salt formation, and
- C) forming a dispersion of the reaction product of 1), 2), 3), 4), 5) and 6) in water and reacting said dispersion with
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- 7) from about 0.1 to about 10% by weight of one or more diamines and/or polyamines,

wherein the weight percents of components 1) through 7) total 100% and the equivalent ratio of the isocyanate groups in component 6) to the sum of the isocyanate-reactive groups in component 1), 2), 3), 4) and 5) is from about 1.2:1 to about 2.0:1.

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2. The emulsion of Claim 1, wherein components 1) through 7) are reacting in the following amounts:

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|--------------|--|---------------------------------------|
| component 1) | from about 5 to about 45% by weight,     |                                       |
| component 2) | from about 5 to about 60% by weight,     |                                       |
| component 3) | from about 10 to about 20% by weight,    |                                       |
| component 4) | from about 2 to about 8% by weight,      |                                       |
| component 5) | from about 1 to about 8% by weight,      |                                       |
| component 6) | from about 10 to about 30% by weight and |                                       |
| 25           | component 7)                             | from about 0.1 to about 3% by weight. |

3. The emulsion of Claim 2, wherein components 1) through 7) are reacting in the following amounts:

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|--------------|---------------------------------------|
| component 1) | from about 20 to about 30% by weight, |
| component 2) | from about 30 to about 40% by weight, |
| component 3) | from about 10 to about 15% by weight, |

- |              |  |
|--------------|--|
| component 4) | from about 3 to about 5% by weight,      |
| component 5) | from about 2 to about 4% by weight,      |
| component 6) | from about 13 to about 23% by weight and |
| component 7) | from about 0.5 to about 2% by weight.    |

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4. The emulsion of Claim 1, wherein the weight ratio of component 2) to component 3) is from about 3:1 to about 5:1.

5. The emulsion of Claim 4, wherein the weight ratio of component 2) to component 3) is from about 3:1 to about 4:1.

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6. The emulsion of Claim 1, wherein said equivalent ratio is from about 1.4:1 to about 1.6:1.

7. The emulsion of Claim 1, wherein the OH number of component 1) is from about 100 to about 200, the OH number of component 2) is from about 28 to about 75 and the OH number of component 3) is from about 28 to about 75.

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8. The emulsion of Claim 7, wherein the OH number of component 1) is from about 125 to about 180, the OH number of component 2) is from about 35 to about 65 and the OH number of component 3) is from about 35 to about 65.

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9. The emulsion of Claim 1 further comprising from 0 up to 80% by weight based on the weight of components 1) through 7) of materials selected from the group consisting of acrylate terminated urethanes, acrylate terminated polyesters, acrylate terminated polyethers, acrylate terminated polycarbonates, methacrylate terminated urethanes, methacrylate terminated polyesters, methacrylate terminated polyethers, methacrylate terminated polycarbonates, and mixtures thereof.

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10. The emulsion of Claim 9 wherein said material is present in an amount of from about 10 to about 15% by weight.
- 5 11. The emulsion of Claim 1 additionally comprising from about 0.1 to about 10% by weight, based on the weight of components 1) through 7), of one or more photo-initiators
- 10 12. The emulsion of Claim 11 wherein said photo-initiator is present in amount of from about 3 to about 7% by weight.
13. The radiation cured coated prepared from the emulsion of Claim 1.
14. In a method of prepared a cured coating by applying a coating  
15 composition to a substrate and curing the composition by UV radiation, the improvement wherein the composition is the emulsion of Claim 11.
15. The product produced by the process of Claim 14.